

The Applicants believe that no extension of time is required since this response is being filed before the expiration of the specified time period. The Applicants, however, conditionally petition for a further extension of time to provide for the possibility that such a petition has been inadvertently overlooked and is required. As provided below, charge Deposit Account **04-1105** for any required fee.

#### **FORMALITIES**

The Applicants bring to the Examiner's attention that the Applicants filed an Information Disclosure Statement on April 17, 2003 (receipt of which was acknowledged on April 23, 2003) and that a corrected PTO Form 1449 was filed on May 29, 2003 (receipt of which was acknowledged on June 2, 2003). The Applicants respectfully request that in the Examiner consider the documents contained therein in conjunction with his next review of the present invention.

#### **REMARKS**

Claims 1 through 12 are pending in the subject application. Claims 1-12 stand rejected under 35 U.S.C. 103(a).

The Applicants appreciate the Examiner's thorough examination of the subject application. However, the Applicants respectfully request reconsideration of the subject application based on the following remarks.

#### **35 U.S.C. § 103(a) REJECTION**

The Examiner rejected claims 1, 2, and 12 under 35 USC 103(a) as being unpatentable over admitted prior art in view of U.S. Patent Number 5,537,235 to

Ishihara, et al. ("Ishihara" or the "Ishihara Reference") further in view of U.S. Patent Number 4,526,818 to Hoshikawa, et al. ("Hoshikawa" or the "Hoshikawa Reference"); claims 3-7 and 10-11 under 35 USC 103(a) as being unpatentable over admitted prior art in view of Ishihara, Hoshikawa, and further in view of U.S. Patent Number 6,104,467 to Nakahara, et al. ("Nakahara" or the "Nakahara Reference"); and claims 8-9 under 35 USC 103(a) as being unpatentable over Ishihara in view of Hoshikawa, further in view of Nakahara, and further in view of U.S. Patent Number 6,327,011 to Kim ("Kim" or the "Kim Reference"). The Applicants respectfully traverse these rejections for the reasons provided in greater detail below.

Claims 1, 2, and 12

In his response to our most recent arguments, the Examiner asserts the following counter-arguments:

1. The Ishihara reference discloses the same principle as the present invention to eliminate the uneven display caused by temperature increase;
2. The Ishihara reference discloses a gradual gap increase between the electrodes 32a and 32b at an edge portion 52 of a displaying portion 50 and a peripheral portion 53;
3. It was obvious to one of ordinary skill in the art to form a cell gap using contrary compensation of thermal expansion to counter the greater upwards and downwards expansion of the liquid crystal material at the center of the cell versus the thermal expansion at the edge portion and to maintain a uniform cell gap; and
4. The Hoshikawa reference discloses a cell gap that increases from a center to an end of the display area.

The invention as claimed provides a cell gap that is formed so that, at room temperature, the gap gradually increases from the center of the display area to the ends of the display area. See, e.g., Specification, page 6, lines 12-18. This arrangement serves a two-fold purpose. First, it makes it possible to smooth out

thermal expansion differences, which object is addressed by the prior art, and, second, it prevents a cell gap from being too large at the center of the display area, which object is not addressed by the prior art. See, e.g., Id., page 6, line 22 to page 7, line 2.

In his previous Office Action and in his counter-argument #2 above, the Examiner freely admits that Ishihara does not disclose a gap that increases from the center of the display to the ends of the display. Indeed, Ishihara teaches that the gap is constant in the middle portion 51 of the displaying portion 50, i.e., between the center of the cell and the edge portion 52 of the displaying portion 50, see, e.g., Ishihara, col. 5, lines 58-62; col. 7, lines 18-22; and col. 8, lines 53-56, and only in the peripheral portion 54 is there a gradual increase in the gap to the edge of the cell.

The present invention explains the shortcomings of the prior art such as the principles of Ishihara on pages 5 and 6 and, further, shows these principles illustratively in FIG. 14. Referring to FIG. 14 (on the left) of the present invention, which shows the principles taught by Ishihara, at room temperature, there is a uniform gap in the middle portion and only at the two edge portions is there a gradual increase in the gap distance. However, as the figure further shows (on the right), excessive upwards and downwards movement at the center causes irregular displays, which is one of the shortcomings in the prior art solved by the invention as claimed. Ishihara only makes the effects of temperature more uniform between the edges and the center. Ishihara does not address the effects of having temperature change at the center of the cell. Accordingly, the Applicants again, respectfully, assert that the Examiner's counter-argument #1 is not supported by the Ishihara reference and, as a result, the Ishihara reference does not make the present invention obvious.

With respect to counter-argument #4, the Examiner asserts that Hoshikawa, in FIG. 8, discloses a cell gap that increases from a center to an end of the display area. The Applicants respectfully disagree.

Hoshikawa teaches LCD panels that are fabricated using flexible substrates comprising a polarizing film sandwiched between a pair of plastic films. See, e.g., Hoshikawa, col. 8, lines 27-32. At least one of the pair of plastic films curves outward and pushes inwardly against rigid spacers 5 in the cell. In each of the four embodiments of Hoshikawa, this arrangement provides a uniform cell thickness over the entire surface area of the cell. See, e.g., *Id.*, col. 5, lines 14-21; col. 6, lines 64-68; col. 7, lines 42-47; and col. 7, line 67 to col. 8, line 2. Indeed, one of the stated benefits of Hoshikawa is that of a uniform gap thickness. See, e.g., col. 11, lines 39-48. In short, the cell gap is uniform and therefore cannot increase from the center to the end of the display area. Hoshikawa expressly teaches away from providing a cell gap that increases gradually from the center to the end of the display area.

FIG. 8 of Hoshikawa, which is relied on by the Examiner, merely illustrates an early step in a process to assemble an upper substrate 110 and a lower substrate 220 with the respective convex surfaces facing each other. Although in manufacture the substrate 110 and 220 have convex surfaces, this is done to provide the inward force that maintains the uniform cell gap when temperature increases. FIG. 9 of Hoshikawa illustrates the finished product (as well as FIGs. 1-6) in which the cell gap is uniform and there is no gradual increase. Indeed,

The use of plastic materials for forming the substrates permit imparting of curvature prior to assembly.

*Id.*, col. 11, lines 59-60. The arrangement disclosed by Hoshikawa is totally different from the present invention and certainly does not teach a cell gap that increases from the center to an end of the display area. Therefore, the Applicants respectfully maintain that the Examiner's counter-argument #4 is not supported anywhere in the reference.

With respect to the Examiner's third counter-argument above, the Applicants respectfully maintain that the Examiner has not made a prima facie case of obviousness. Ishihara certainly cannot be relied on as it merely demonstrates an example of the deficiencies in the prior art. The Examiner admits that Hoshikawa is a secondary reference; however, Hoshikawa teaches a uniform cell gap not one that gradually increases from the center to the edges of the display area. There is nothing in the prior art that suggests, mentions, teaches or provides motivation to provide an LCD with a cell gap that increases gradually from the center. To the contrary, the Applicants herein claim that they believe themselves to be the first and true inventors of the principle. The suggestion that it might have been obvious to try, which has not been proven by the Examiner, is not sufficient to uphold a § 103(a) rejection.

Accordingly, the Applicants respectfully assert that, claims 1, 2, and 12 are not made obvious by the admitted prior art in view of the Ishihara and Hoshikawa references.

#### Claims 3-7 and 10-11

The Examiner admits that Nakahara is a secondary reference and, impliedly, the Nakahara reference also cannot make up for the deficiencies of the Ishihara and Hoshikawa references. As provided in our earlier response, Nakahara neither teaches, mentions nor suggests resolving irregular display color of an LCD device resulting from a change in an atmospheric temperature by means of controlling the cell gap distance, and, more particularly, by forming a cell gap between a pair of insulating substrates so as to increase gradually from the center to the end of the display area at room temperature.

Accordingly, the Applicants respectfully assert that, claims 3-7 and 10 are not made obvious by the combination of the three references.

Claims 8-9

The Examiner similarly admits that Kim is a secondary reference and, impliedly, the Kim reference cannot make up for the deficiencies of the Ishihara, Hoshikawa, and Nakahara references. Indeed, the Kim reference neither teaches, mentions nor suggests resolving irregular display color of an LCD device resulting from a change in an atmospheric temperature by means of controlling the cell gap, and, more particularly, by forming a cell gap between the pair of insulating substrates so as to increase gradually from the center to the end of the display area at room temperature.

Accordingly, the Applicants respectfully assert that, claims 8-9 are not made obvious by the combination of the four references.

In short, it is respectfully submitted that, claims 1-12 are not made obvious by any of the cited references, and further, satisfy all of the requirements of 35 U.S.C. 100, et seq., especially § 103(a). Accordingly, claims 1-12 are allowable. Moreover, it is respectfully submitted that the subject application is in condition for allowance. Early and favorable action is requested.


T. Noguchi, et al.  
U.S.S.N. 09/491,585  
Page 8

The Applicants believe that no additional fee is required for consideration of the within Response. However, if for any reason the fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

Date: July 16, 2003

By:



George W. Hartnell, III  
Reg. No. 42,639

EDWARDS & ANGELL, LLP  
P.O. Box 9169  
Boston, MA 02209  
Tel.: (617) 517-5523  
Customer No. 21874  
339573